EAST WINDSOR, CONNECTICUT

BROAD BROOK MILL POND DAM
CT-00271

NATIONAL DAM INSPECTION PROGRAM
CORPS OF ENGINEERS

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE March 1980 13. NUMBER OF PAGES 50
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
East Windsor, Conn.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is a 15 ft. high stone masonry, gravity strucure, probably on bedrock for its entire length. The project is approx. 193 ft. in length, consisting of an 81 ft. lo masonry spillway section, a 32 ft. long masonry and earthfill section to the left of th spillway. Based upon visual inspction. the project is in poor condition.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

The dam is a 15 foot high stone masonry, gravity structure, probably founded on bedrock for its entire length. The project is approximately 193 feet in length, consisting of an 81 foot long masonry spillway section, a 32 foot long masonry and earthfill section to the left of the spillway, and an 80 foot long stone masonry and earthfill dike extending upstream from the spillway along the right side of the impoundment. Two wood sluice gates, controlling flow to a downstream factory, are located at the left end of the dam. A single span highway bridge along Connecticut Route 191 crosses the stream approximately 50 feet downstream of the dam.

The spillway, with an overflow length of 77 feet, is a broad-crested masonry weir of trapezoidal cross-section, with a permanently attached timber crest and breakaway flashboards. The spillway is separated into two sections by a stone masonry pier which houses an inoperable low level outlet. The spillway approach channel is shallow and rocky. The downstream face of the spillway is vertical, with the natural bedrock stream channel functioning as a splash apron.

For the Owner's information and use, the following items are attached:

1. "Visual Inspection Check List".
2. Hydraulic/Hydrologic computations.
3. Existing data and correspondence
4. Photos of project.

Based upon visual inspection, the project is in poor condition. The following features could influence the future condition and/or stability of the project.

1. Areas of the upstream and downstream masonry faces of the dam and sluice gate channel are deteriorated. This deterioration includes missing or cracked mortar, and weathered or displaced stone blocks.
2. There is a seep of approximately 4 to 6 gallons per minute near the left end of the dam.
3. The low-level outlet is inoperable.
4. The upstream slope of the dike is eroded.

The Owner should retain the services of a registered professional engineer to perform further studies pertaining to the following general recommendations. More specific recommendations made by the engineer should be implemented by the owner.

1. The areas of deteriorated masonry on the upstream and downstream faces of the dam, as well as the sluice gate intake and outlet channels should be investigated, analyzed and repaired.

2. Seepage through the dam should be investigated. Measures should be undertaken to eliminate the seepage, or a seepage monitoring program should be established.

3. The low-level outlet should be made operable or a new one installed in order to draw down the pond level, should the need occur.

4. The eroded areas of the upstream slope of the dike should be filled with selected soil, graded and protected from future erosion.

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Broad Brook Reservoir Dam DATE: March 24, 1980

TIME: 10:00 am - 12:00 noon

WEATHER: Sunny, 45° F

W.S. ELEV. 850 ± U.S. _____ DN.S

PARTY:	INITIALS:	DISCIPLINE:
1. Peter M. Heynen	PMH	Project Manager
2. Miron Petrovsky	MP	Sr. Geotech. Engr.
3. Theodore Stevens	TS	Project Engineer
4. Hector Moreno	HM	Chief Hydraulic Engr.
5. Moshe Norman	MN	Survey
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Earthfill Masonry Section	PMH, MP, TS, HM, MN	
2.	Masonry Dike	Same	
3.	Intake Structure	Same	
4.	Outlet Structure	Same	
5.	Low-Level Outlet	Same	
6.	Masonry Spillway	Same	
7.	Gate Structure	Same	
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT Broad Brook Reservoir Dam DATE March 24, 1980

PROJECT FEATURE Earthfill Masonry Section BY PMH,MP,TS,HM,MN

AREA EVALUATED		CONDITION
DAM EMBANKMENT		
Crest Elevation		88.6 ±
Current Pool Elevation		85.0 ±
Maximum Impoundment to Date		Unknown
Surface Cracks		Some, masonry and joints
Pavement Condition		N/A
Movement or Settlement of Crest		Irregular earthfill top
Lateral Movement		None observed
Vertical Alignment		Appears good
Horizontal Alignment		
Condition at Abutment and at Concrete Structures		Good
Indications of Movement of Structural Items on Slopes		None observed
Trespassing on Slopes		N/A
Sloughing or Erosion of Slopes or Abutments		Erosion & cracking on d/s slope
Rock Slope Protection-Riprap Failures		Eroded masonry of u/s wall
Unusual Movement or Cracking at or Near Toes		None observed
Unusual Embankment or Downstream Seepage		Seep on d/s slope near toe w/rate appox. 4-6 gpm
Piping or Boils		None observed
Foundation Drainage Features		N/A
Toe Drains		12" high-level tile drain clogged by wood
Instrumentation System		N/A

PERIODIC INSPECTION CHECK LIST

PROJECT Broad Brook Reservoir Dam DATE March 24, 1980

PROJECT FEATURE Masonry Dike BY PMH, MP, TS, HM, MN

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	
Crest Elevation	89.4±
Current Pool Elevation	85.4±
Maximum Impoundment to Date	Unknown
Surface Cracks	Some, in masonry
Pavement Condition	Fair, top of masonry wall
Movement or Settlement of Crest	None observed
Lateral Movement	
Vertical Alignment	Appears good
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None observed
Sloughing or Erosion of Slopes or Abutments	Eroded earthfill slopes
Rock Slope Protection-Riprap Failures	N/A
Unusual Movement or Cracking at or Near Toes	None observed
Unusual Embankment or Downstream Seepage	
Piping or Boils	
Foundation Drainage Features	N/A
Toe Drains	
Instrumentation System	
Trespassing on Slopes	Some

PERIODIC INSPECTION CHECK LIST

PROJECT Broad Brook Reservoir Dam DATE March 24, 1980

PROJECT FEATURE Intake Structure BY PMH, MP, TS, HM, MN

AREA EVALUATED	CONDITION
OUTLET WORKS-INTAKE CHANNEL AND INTAKE STRUCTURE	
a) Approach Channel	Masonry w/ concrete lining
Slope Conditions	Eroded masonry
Bottom Conditions	Not observed
Rock Slides or Falls	None observed
Log Boom	Good
Debris	Floating leaves & wood
Condition of Concrete Lining	fair, some cracking
Drains or Weep Holes	N/A
b) Intake Structure	N/A
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECK LIST

PROJECT Broad Brook Reservoir Dam DATE March 24, 1980

PROJECT FEATURE Gate Structure BY PMH, MP, TS, HM, MN

AREA EVALUATED	CONDITION
OUTLET WORKS-CONTROL TOWER	
a) Concrete and Structural	
General Condition	Fair
Condition of Joints	Fair, masonry joints
Spalling	Same
Visible Reinforcing	N/A
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	None observed
Joint Alignment	N/A
Unusual Seepage or Leaks in Gate Chamber	None observed
Cracks	Some
Rusting or Corrosion of Steel	N/A
b) Mechanical and Electrical	
Air Vents	N/A
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	Two 2' x 7.5' wooden sluice gates, operable
Emergency Gates	N/A
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECK LIST

PROJECT Broad Brook Reservoir Dam DATE March 24, 1980

PROJECT FEATURE Outlet Structure BY PMH, MP, TS, HM, MN

AREA EVALUATED	CONDITION
OUTLET WORKS-OUTLET STRUCTURE AND OUTLET CHANNEL	Masonry w/ concrete lining
General Condition of Concrete	Fair
Rust or Staining	N/A
Spalling	Some cracking
Erosion or Cavitation	None observed
Visible Reinforcing	N/A
Any Seepage or Efflorescence	3 seeps on d/s overflow side w/flow appox. 16-20 gpm
Condition at Joints	N/A
Drain Holes	
Channel	
Loose Rock or Trees Overhanging Channel	N/A
Condition of Discharge Channel	Eroded d/s masonry of overflow side.

PERIODIC INSPECTION CHECK LIST

PROJECT Broad Brook Reservoir Dam DATE March 24, 1980

PROJECT FEATURE Masonry Spillway BY PMH, MP, TS, HM, MN

AREA EVALUATED	CONDITION
OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a) Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	N/A
Trees Overhanging Channel	N/A
Floor of Approach Channel	Not observed
b) Weir and Training Walls	
General Condition of Concrete	Fair
Rust or Staining	N/A
Spalling	Deteriorated masonry on d/s slope
Any Visible Reinforcing	N/A
Any Seepage or Efflorescence	Seeps & wet joints on right side of d/s slope w/flow = 1-2 gpm.
Drain Holes	N/A
c) Discharge Channel	
General Condition	Fair
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	None observed
Floor of Channel	Bedrock
Other Obstructions	Boulers, stones and masonry blocks at central and left portions of spillway apron

PERIODIC INSPECTION CHECK LIST

PROJECT Broad Brook Reservoir Dam DATE March 24, 1980

PROJECT FEATURE Low-Level Outlet BY PMH, MP, TS, HM, MN

AREA EVALUATED	CONDITION
OUTLET WORKS-CONTROL TOWER	Old outlet at base of center masonry pier approx. 3'x 3'
a) Concrete and Structural	
General Condition	Not inspected because of overflowing spillway
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b) Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	N/A
Elevator	
Hydraulic System	
Service Gates	Not observed
Emergency Gates	
Lightning Protection System	N/A
Emergency Power System	
Wiring and Lighting System	

HYDROLOGIC/HYDRAULIC INSPECTION

BROAD BROOK MILL POND DAM, EAST WINDSOR, CT.

I) PERFORMANCE AT PEAK FLOOD CONDITIONS:

1) PROBABLE MAXIMUM FLOOD (PMF):

a) WATERSHED CLASSIFIED AS "FLAT" TO "ROLLING"

b) WATERSHED AREA: D.A. = 13.6 SQ. MI.
(C.E. MEASURE. - NOTE: CONN. DEP. BULLETIN No 1, 1970 (CRITERIA OF NATURAL DRAINAGE AREAS) P. 26 SHOWS D.A. = 14.6 SQ. MI. HOWEVER, THIS MEASURE DOES NOT CORRELATE WITH D.A. TO USGS GAGING STA. 1844.9)

c) PEAK FLOODS (FROM NED-ACE GUIDELINES - GUIDE CURVES FOR PMF):

i) FROM GUIDE CURVES, CSM = 1200 CFS/SQ. MI.

ii) PMF = 1200 x 13.6 = 16300 CFS

iii) ½ PMF = 8150 SAY, 8100 CFS

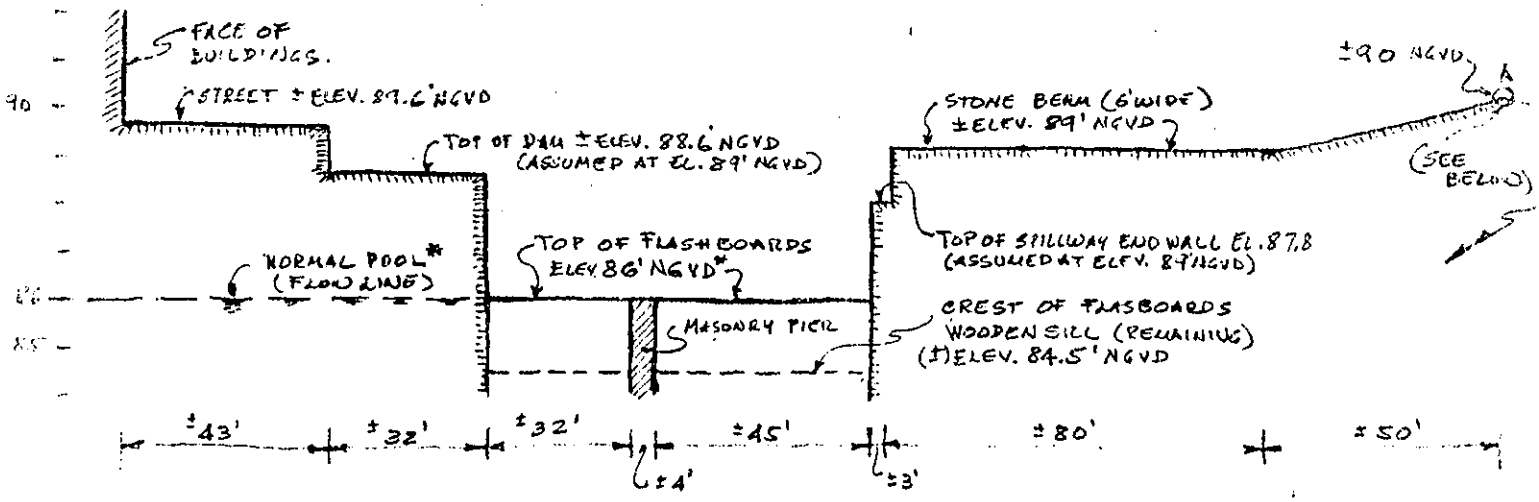
2) SURCHARGE AT PEAK INFLOWS (PMF AND ½ PMF)

a) OUTFLOW RATING CURVE

i) SPILLWAY AND OVERFLOW PROFILE FOR SURCHARGES OVERTOPPING THE DAM

2-SPILLWAY SECTIONS, BOTH WITH FLASH BOARDS (RIGHT SPILLWAY FLASHBOARD IS COLLAPSED) ABOVE PERMANENT WOODEN SILL (PLATFORM) ATOP MASONRY. FLASHBOARDS DESIGNED TO FAIL AT (±) 2' HEAD (SEE MACCI ENGRS. LETTER OF MAY 3, 1976). CENTRAL PIER ASSUMED TO BE (±) AT SAME ELEV. AS TOP OF FLASHBOARDS (SEE OVERFLOW PROFILE P. D-2).

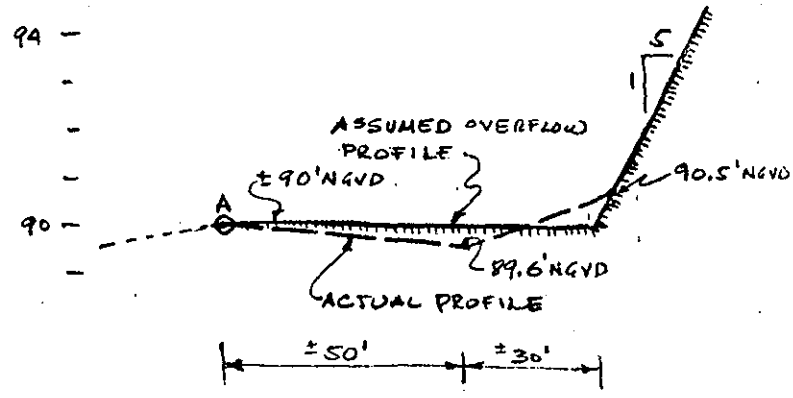
THEREFORE, ASSUME $C^* = 3.3$ FOR SPILLWAY FLOW, EITHER OVER THE FLASHBOARDS OR OVER THE WOODEN CREST REMAINING AFTER COLLAPSE OF THE FLASHBOARDS. ASSUME $C = 3.0$ FOR TOP OF DAM AND OTHER OVERFLOWS.
ASSUME FLASHBOARDS IN PLACE FOR OVERFLOW CURVE DEVELOPMENT, FOR HEADS UP TO .2'



BROAD BROOK MILL POND DAM
APPROXIMATE OVERFLOW PROFILE

NOTE: DATA FROM C.E. OBSERVATIONS ON 4/11/80 BY HML & R.J.

*SEE NOTE ON P. D-4



(ii) THEREFORE, ASSUMING EQUIVALENT LENGTHS FOR THE SLOPING TERRAIN, THE OVERFLOW CURVE CAN BE APPROXIMATED AS FOLLOWS:

1') STREET $Q_{ST} = 3.0 \times 43 \times (H-3.6)^{3/2} = \underline{129\,(H-3.6)^{3/2}}$

NOTE: FLASHBOARDS TOP (CREST) ELEV. 86' NGVD ASSUMED AS DATUM.

2') TOP OF DAM & ADJACENT TERRAIN AT ASSUMED ± ELEV. 89' NGVD:

$$Q = 3.0 \times 115 \times (H-3)^{3/2} = \underline{345\,(H-3)^{3/2}}$$

3') SPILLWAY SECTIONS

a,) WITH FLASHBOARDS:

$$Q_{S_1} = 3.3 \times 77 \times H^{3/2} + 3 \times 4 \times H^{3/2} \approx \underline{266\,H^{3/2}} \qquad (H \leq 2')$$

b,) W/O FLASHBOARDS:

$$Q_{S_2} = \underline{254\,(H+1.5)^{3/2} + 12\,H^{3/2}} \qquad (H > 2')$$

4') SLOPING TERRAIN (RIGHT)

$$(Q_R')_1 = \tfrac{2}{3} \times 50 \times 3 \times (H-3)^{5/2} = \underline{100\,(H-3)^{5/2}} \qquad H \leq 4'$$

$$(Q_R')_{1'} = 3 \times 50 \times (H-3.23)^{3/2} = \underline{150\,(H-3.23)^{3/2}} \qquad H > 4'$$

5') TERRAIN (RIGHT) ASSUMED AT ± ELEV. 90' NGVD

$$Q_{R_2} = 3 \times 80 \times (H-4)^{3/2} = \underline{240\,(H-4)^{3/2}}$$

6') SLOPING TERAIN ABOVE ± ELEV. 90' NGVD (RIGHT)

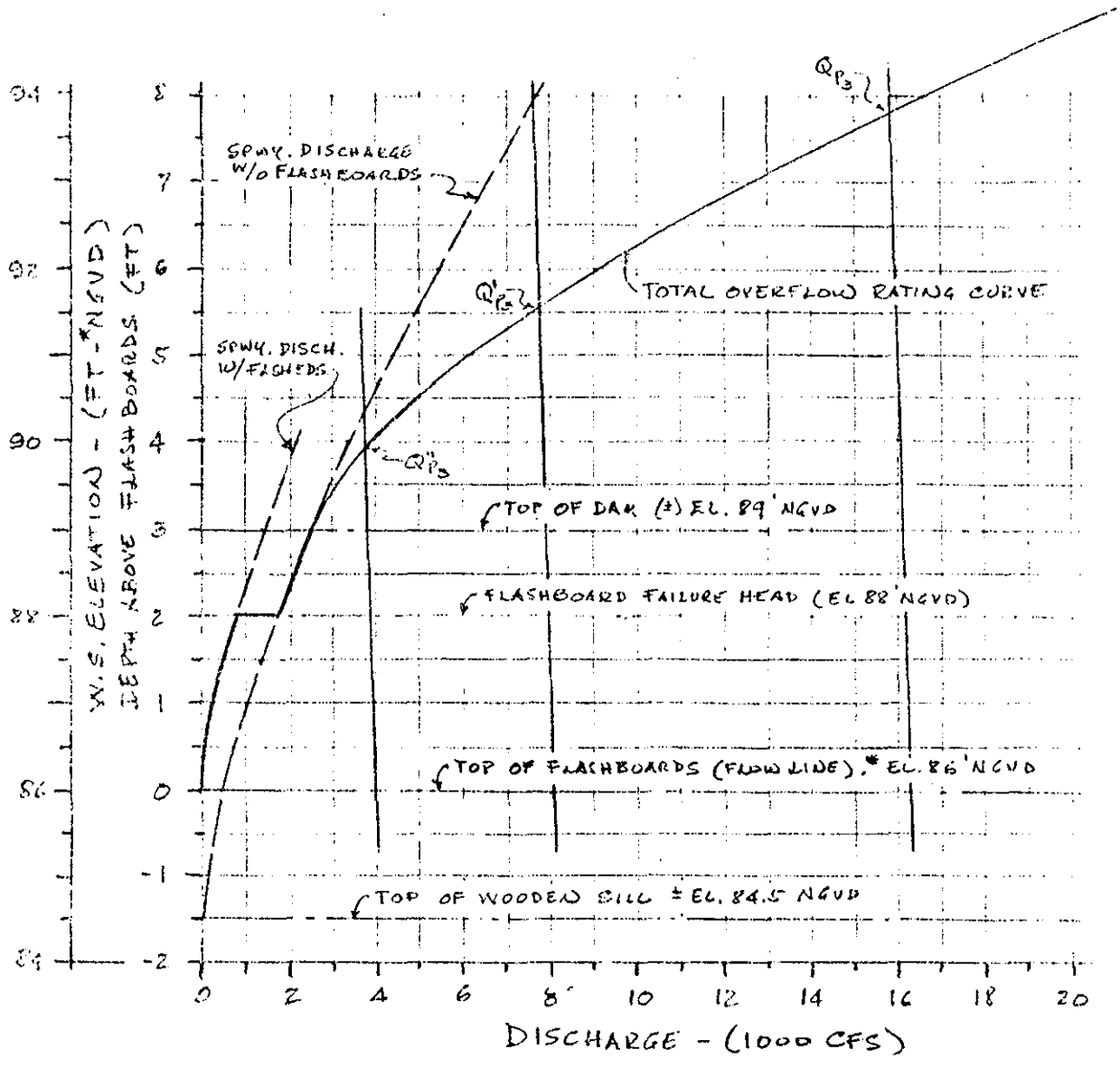
$$Q_{R_3} = \tfrac{2}{3} \times 5 \times 3 \times (H-4)^{5/2} = \underline{10\,(H-4)^{5/2}}$$

THEREFORE, THE TOTAL OUTFLOW IS APPROXIMATED BY:

$$Q = Q_{S1} + Q_3 + Q_{S*} + (Q_R')_* + Q_{R_2} + Q_{R_3}$$

WHERE THE (*) REPLACES THE SUBINDEX OF THE APPLICABLE FORMULAE ON (3') AND (4') ABOVE.

(ii) Broad Brook Mill Pond Dam - Outflow Rating Curve



*NOTE: W.S. ELEV. 86' ON THE BROAD BROOK, CT. QUADRANGLE SHEET (REV. 1972) IS ASSUMED TO BE THE FLASHBOARDS TOP ELEVATION (NORMAL POOL) ON NATIONAL GEODETIC VERTICAL DATUM (NGVD).

b) SURCHARGE HEIGHT TO PASS PEAK INFLOWS (Q_{P_1} & Q'_{P_1})

i) @ Q_{P_1} = PMF $\simeq$ 16300 CFS $H_1 \simeq$ 7.9'

ii) @ Q_{P_2} = ½ PMF $\simeq$ 8100 CFS $H'_1 \simeq$ 5.7'

c) EFFECT OF SURCHARGE STORAGE — PEAK OUTFLOWS:

i) ADJ LAKE AREA WITHIN EXPECTED SURCHARGE ($\bar{A}$):

1') LAKE AREA AT FLOW LINE (EL. 86' NGVD): $^*A_{WL} \simeq 18$ AC
2') AREA AT CONTOUR 90' NGVD (MSL)* $A_{90} = 52$ AC
3') AREA AT CONTOUR 100' NGVD (MSL)* $A_{100} = 107$ AC

∴ AREA AT ELEV. 94' NGVD (MAX EXPECTED SURCH): $A_{94} \simeq 75$ AC

∴ AVE. AREA WITHIN EXPECTED SURCHARGE: $\bar{A} \simeq 52$ AC ($\simeq A_{90}$)

*NOTE: AREAS FROM USGS BROAD BROOK, CT. QUAD. SHEET (SCALE 1"=2000') AND GRAPHICAL INTERPOLATION.

ii) ASSUME NORMAL POOL AT FLOW LINE (ELEV. 86' NGVD)

iii) WATERSHED D.A. $\simeq$ 13.6 Sq mi (SEE p. D.1)

iv) PEAK OUTFLOWS (Q_{P_3} & Q'_{P_3})

(DETERMINED ON THE OUTFLOW RATING CURVE p. D-4 BY USING THE APPROX. ROUTING NED-ACE GUIDELINES "SURCHARGE STORAGE ROUTING" ALTERNATE METHOD AND 19" MAX. PROBABLE R.D. IN NEW ENGLAND)

$Q_{P_3} \simeq$ 15800 CFS $H_3 \simeq$ 7.8'

$Q'_{P_3} \simeq$ 7800 CFS $H'_3 \simeq$ 5.6'

3) SPILLWAY CAPACITY RATIO TO PEAK INFLOWS AND OUTFLOWS

SPILLWAY CAPACITY TO:	SURCH.* H (FT)	W.S. ELEV. (FT-NGVD)	SPILLWAY CAPACITY (CFS)	SPILLWAY CAPACITY AS % OF INFLOWS AND OUTFLOWS			
				Q_{P_1} (16300 CFS)	Q'_{P_1} (8100 CFS)	Q_{P_2} (15800 CFS)	Q'_{P_2} (7800 CFS)
TOP OF DAM	3	89	2500	15	31	16	32
½ PMF	5.6	91.6	5000	—	62	—	64
PMF	7.8	93.8	7500	46	—	47	—

*SURCHARGE ABOVE TOP OF FLASHBOARDS (ELEV. 86 NGVD)

BROAD BROOK MILL POND DAM

II) DOWNSTREAM FAILURE HAZARD

1) POTENTIAL IMPACT AREA

EXCEPT FOR ONE HOUSE (±) 2500' D/S FROM THE DAM WITH FIRST FLOOR (±) 6' ABOVE THE STREAMBED, THE STRUCTURES ALONG BROAD BROOK TO THE SCANTIC RIVER (BOTH ON RURAL - UNDEVELOPED LAND) ARE 11' OR MORE ABOVE THE BROOK CHANNEL.

2) FAILURE AT BROAD BROOK MILL POND DAM:

ASSUME SURCHARGE TO TOP OF DAM (ELEV. 84' NGVD)

a) HEIGHT OF DAM*: $H \approx 15'$

b) MID-HEIGHT LENGTH*: $L \approx 115'$

c) BREACH WIDTH (SEE NED-ACE D/S DAM FAILURE GUIDELINES)

$W = 0.4 \times 115 = 46'$ ASSUME $W_b = \underline{46'}$

BECAUSE THE LONGEST ABUTMENT TO MID-HEIGHT IS (±) 15' THE ASSUMED BREACH WILL OVERLAP A MIN. OF 30' OF SPILLWAY SECTION.

d) ASSUMED WATER DEPTH (HEAD) AT TIME OF FAILURE: $Y_o = \underline{15'}$

e) SPILLWAY DISCHARGE AT TIME OF FAILURE:

i) PREVIOUS TO FAILURE $Q_s = 2500$ cfs (SEE p. D-6)

ii) AFTER FAIL. REMAIN. SPWY/PIER (±51'): $Q_s' \approx 1000$ cfs

*FROM C.E. MEASUREMENTS ON 4/1/80 BY HWL & R.J.

f) BREACH OUTFLOW (SEE NED-ACE GUIDELINES)

$$Q_b \cong {}^{8}/_{27}\, W_b \sqrt{g}\, y_o^{3/2} = 4500^{cfs}$$

g) PEAK FAILURE OUTFLOW (Q_{p_1}) TO BROAD BROOK:

$$Q_{p_1} = Q_s' + Q_b \cong \underline{5500}^{cfs}$$

3) FLOOD DEPTH* IMMEDIATELY D/S FROM DAM:

$$y \cong 0.44\, y_o = 6.6' \quad \text{SAY, } y \cong \underline{7'}$$

(*FROM RETREATING WAVE THEORY APPLIED TO DAM FAILURE)

4) ESTIMATE OF D/S FAILURE CONDITIONS AT POTENTIAL IMPACT AREA:

(SEE NED-ACE GUIDELINES FOR ESTIMATING D/S FAILURE HYDROGRAPHS)

a) THE (±) 2500' LONG REACH OF BROAD BROOK FROM THE DAM TO THE POTENTIAL IMPACT AREA IS GENERALLY TRAPEZOIDAL IN CROSS SECTION WITH (±) 100' BASE AND (±) 5H AND (±) 6H TO 1V SIDE SLOPES. THE AVERAGE REACH SLOPE IS (±) 0.6%.

b) RESERVOIR STORAGE AT TIME OF FAILURE:

$$^{*}S_{MAX} \cong \underline{130}^{AC\cdot FT} \qquad (\tfrac{1}{2}S \cong 65^{AC\,FT})$$

*STORAGE FROM U.S. ACE INVENTORY OF DAMS DATED 1/23/80, p.31: $S_{MAX} = 127^{AC\,FT}$
C.E. ESTIMATE BASED ON AN AVE (MAX.) DEPTH OF (±) 7': $S = 126^{AC.FT.}$
ALSO, ESTIMATED BY $S = .5AH$, $S = 135^{AC\,FT}$. SO, USE $S_{MAX} = 130^{AC.FT.}$

c) APPROXIMATE STAGE AT POTENTIAL IMPACT AREA AFTER FAILURE

$Q_{p_1} = 5500^{cfs}$ $\therefore$ $^{**}y_1 \cong 6.2'$; $V_1 \cong 47^{AC\cdot FT}$ $\frac{S}{2}$ @ (ON REACH OF 2500'; $^{**}n = 0.050$)

Cahn Engineers Inc. Consulting Engineers

Project: NON-FEDERAL DAMS INSPECTION Sheet D-9 of 10
Computed By: HW Checked By: GAB Date: 4/7/80
Field Book Ref. Other Refs. CE #27-785-HA Revisions

$\therefore Q_{P_2} = 3400^{CFS}$; $Y_2 = 4.7'$; $V_2 = 34$; $\bar{V} = 41$ $\therefore Q_{P_3} = 3700^{CFS}$

$\therefore$ REACH OUTFLOW: $Q_{P_3} \cong$ **3700** ^{CFS} $Y_3 \cong$ **5'**

d) APPROXIMATE STAGE BEFORE FAILURE: $Q_S = \underline{2500}^{CFS}$ $Y_S \cong \underline{4}'$

e) RAISE IN STAGE AT IMPACT AREA: $\Delta Y \cong \underline{1}'$

III) SELECTION OF TEST FLOOD

1) CLASSIFICATION OF DAM ACCORDING TO NED-ACE GUIDELINES:

a) SIZE: *STORAGE (MAX) $\cong 130^{ACFT}$ ($50 < S < 1000^{ACFT}$)
HEIGHT $\cong 15'$ ($H < 25^{FT}$)

* STORAGE: SEE p. D-8 ; HEIGHT: SEE p. D-7

$\therefore$ SIZE CLASSIFICATION: **SMALL**

b) HAZARD POTENTIAL: AS A RESULT OF THE D/S FAILURE ANALYSIS AND IN VIEW OF THE IMPACT THAT FAILURE OF BROAD BROOK MILL POND DAM MAY HAVE ON THE POTENTIAL IMPACT AREA (p D-7), THE DAM IS CLASSIFIED AS HAVING:

HAZARD CLASSIFICATION: **LOW**

2) TEST FLOOD: 50 TO 100-YR FREQ. FLOOD.

NOTE: ALTHOUGH IT HAS NOT BEEN ESTIMATED THE 100-YR FREQ. FLOOD IS ASSUMED TO BE OF THE ORDER OF MAGNITUDE OF $Q_{100} \cong 4000$ CFS. THIS ASSUMPTION SEEMS IN AGREEMENT WITH ESTIMATES IN PREVIOUS STUDIES.

AT $Q_{100} = 4000$ CFS, THE DAM WILL BE OVERTOPPED BY (±)0.9' TO 1.3' ($Q_{\frac{2}{3}}'' = 3800$ CFS) OR TO A SURCHARGE OF (±) 3.9' ABOVE NORMAL POOL ELEV. 86' NGVD (TOP OF FLASHBOARDS). (SEE p. D-4.) THE SPILLWAY CAPACITY IS THEREFORE (±)83% OF THE TEST FLOOD AND (±) 87% OF THE TEST FLOOD PEAK OUTFLOW).

BROAD BROOK MILL POND DAM

Existing Plan

"Proposed Reconstruction"
Broad Brook Mill Pond Dam
East Windsor, Conn.
A. R. Lombardi Associates, Inc.
August 20, 1979
1 Sheet

SUMMARY OF DATA AND CORRESPONDENCE

DATE	TO	FROM	SUBJECT	PAGE
-	File	State Board for the Supervision of Dams	Inventory Data	B-3
Dec. 19, 1955	State Board for the Supervision of Dams	Henry W. Buck Buck & Buck Engineers	Request for inspection of dam	B-4
Jan. 12, 1956	William S. Wise Chairman, State Water Commission	Benjamin H. Palmer Member, State Board for the Supervision of Dams	Inspection Report	B-5
June 22, 1956	State Board	John J. Mozzochi, Engineer	Application for construction permit, sketch of dam, computations, and specifications for repairs to dam	B-7
June 29, 1956	John J. Mozzochi	Benjamin H. Palmer	Preliminary Construction permit	B-12
Dec. 3, 1956	William S. Wise	Benjamin H. Palmer	Certificate of Approval	B-13
March 20, 1963	A. J. Macchi	Emitt A. Dell Field Inspector	Request for inspection of dam	B-14
April 18, 1963	Water Resources Commission	A. J. Macchi, Engineers	Revision of flashboard design	B-15
June 1, 1966	Water Resources Commission	John L. Daly, Jr. First Selectman Town of East Windsor	Request for report on condition of dam	B-17

CT-271 U.S.

STATE BOARD FOR THE SUPERVISION OF DAMS
INVENTORY DATA

NAME OF DAM OR POND BROAD BROOK MILL POND

CODE NO. ~~EW~~ (SC PC B10

Photo shows large Spillway with wood flashB on top.

LOCATION OF STRUCTURE:

Town EAST WINDSOR

Name of Stream BROAD BROOK

U.S.G.S. Quad. B'Brook Long. 72-32.7 Lat 41-55.0

OWNER: ~~HAMILTON STANDARD~~ ~~Co~~ OWNERSHIP TO BE ~~CHECKED~~

Address TOWN OF EAST WINDSOR OK 12/78

11 RYE ST. BROAD BROOK 06016 DA = 11.65M

Telephone 623-8373

THIS DAM HAS BEEN A SOURCE OF TROUBLE
QUITE APPARANT THAT SPILLWAY IS INADEQUATE

Pond Used For: ORGINALLY FOR PROCESS WATER (WINDSOR MON

Dimensions of Pond: Width 500 Length 2,000' Area 25. A

Depth of Water below Spillway Level (Downstream) ~~12'~~ 10'

Total Length of Dam 30' Length of Spillway ~~50'~~ 80'

Height of Abutments above Spillway ~~3~~ 1'

Type of Spillway Construction STONE WITH FLASH BOARDS

Type of Dike Construction EARTH & STONE

1880? Downstream Conditions RE # 191 40' Down stream

Summary of File Data CHECK FILE ON THIS MOST MADE FILE

Remarks THIS OLD DAM IS IN POOR CONDITION. HAS 2' FLASH BOARDS ON TOP WHICH SHOULD BE REMOVED OR REPAIRED. BOARD MEMBER SHOULD INSPECT THIS DAM. AS IT APPEARS TO BE IN NEED OF REPAIRS

TELL — CHECK FILE ON THIS BEFORE DECISION MADE—

BUCK & BUCK

ENGINEERS

650 MAIN STREET HARTFORD 3, CONNECTICUT

HENRY WOLCOTT BUCK
ROBINSON D. BUCK

COMM. 5574-1 DECEMBER 19, 1955

STATE BOARD FOR SUPERVISION OF DAMS
165 CAPITOL AVENUE
HARTFORD, CONNECTICUT

GENTLEMEN:

WE ARE WRITING ON BEHALF OF OUR CLIENTS CHARLES E. PRESSLER, JR. AND ROBERT J. PIGEON, OWNERS OF THE BUILDING IN THE CENTER OF THE VILLAGE OF BROAD BROOK ON THE WEST SIDE OF MAIN STREET, IMMEDIATELY NORTH OF BROAD BROOK, ACTING THROUGH THEIR ATTORNEYS, PIGEON AND KAHAN, OF ROCKVILLE, CONNECTICUT.

THIS BUILDING WAS SEVERELY DAMAGED AT THE TIME OF THE FLOOD LAST AUGUST AND OUR CLIENTS WISH TO PETITION YOUR BOARD FOR AN INSPECTION OF THE DAM AT BROAD BROOK POND IN ACCORDANCE WITH SECTION 4730 OF THE GENERAL STATUTES. OUR PETITION RELATES TO THE CAPACITY OF THE SPILLWAY PROVIDED AT THIS STRUCTURE AND ITS EFFECT ON THE BREAKING AWAY OF THE EARTHEN PORTIONS OF THE DAM AND NOT TO THE STRUCTURAL ADEQUACY OF THE SPILLWAY SECTION OF THE DAM.

SINCERELY YOURS,

BUCK & BUCK

H. Wolcott Buck

HENRY WOLCOTT BUCK

STATE OF CONNECTICUT
STATE BOARD FOR THE SUPERVISION OF DAMS
317 STATE OFFICE BUILDING, HARTFORD 15

January 12, 1956

Re: Broad Brook Pond Dam
East Windsor, Connecticut

Mr. William S. Wise
Chairman, State Water Commission
Hartford, Connecticut

Dear Sir:-

On last Saturday I visited the dam at Broad Brook just above the main road in the Village of Broad Brook and Town of East Windsor.

The dam is located just east of the highway and is a stone masonry dam about 84 feet long and is about 12 feet high. There appear to be wooden flashboards above the masonry for a depth of about 3 feet. The height from top of flashboards to top of abutment wall is 3 feet also. There is a stone wall along the south side of pond at about the 3 foot height and along the west side of pond is a stone wall and further on an earthen embankment. I do not know if this bank was overtopped in the recent floods but I suspect it was. There is a pond of perhaps 10 acres at this point.

The drainage area at the point of dam on Broad Brook is 14.8 square miles. The length of main stream is 6.5 miles. Branches are small and although included in drainage area are not considered separately in general stream slope. The elevation at source of stream is 600 and at dam is about Elevation 100 giving a slope of 500 feet in 6.5 miles or an average slope of 77 feet per mile. There does not appear to be any abnormal storage along the stream.

The mean annual flood then becomes

$$Qm = 0.85 \; A \; S$$
$$Qm = 0.85 \times 14.8 \times 77$$
$$= 968 \text{ cubic feet per second}$$

A flood of 100 year frequency equals 3.7 times the mean annual

$$\therefore Q = 3.7 \times 968$$
$$= 3580 \text{ cubic feet per second for 100 year frequency.}$$

Present dam is 84 feet long and 3 feet high to abutments from top of flashboards. This is good for 1478 cubic feet per second.

Conclusion:

It is my opinion that the present spillway capacity is wholly inadequate for a 100 year flood. If all flashboards were removed to the masonry top, then an adequate capacity would be provided.

Very truly yours,

B. H. Palmer.

BHP/ew

Sent original to Mr. B. Palmer 6-26-56

June 22 56
2:00 P.
Grace E. Perkins
Town Clerk

STATE BOARD OF SUPERVISION OF DAMS

APPLICATION FOR CONSTRUCTION PERMIT
As required under Section 4731 of General Statutes

THIS APPLICATION TO BE SUBMITTED IN TRIPLICATE

Hamilton Standard Division
United Aircraft Corp.

Date June 22, 1956

Owner ~~c/o John J. Mozzochi~~

Tel. No. Medford 3-9401

P. O. Address ~~265 Hebron Avenue~~

~~Glastonbury, Connecticut~~

Location of Structure:

Town ~~Broad Brook~~ Shown on USGS Quadrangle Broad Brook

Name of Stream ~~Broad Brook~~ at 5.8 inches ~~south~~ north of Lat. 41°-52'-30"

abd 1.75 inches ~~east~~ west of Long. 72°-30'

Directions for reaching site from nearest village or route intersection:
(See sketch on reverse side)

~~Dam is at the intersection of Connecticut Rt. No. 140 (Main Street) and~~

~~Depot Street in the center of Broad Brook.~~

This is an application for: ~~(New Construction)~~ (Alteration) (Repair) ~~(Removal)~~
(describe project)

This pond is to be used for: ~~Manufacturing and recreation~~

Dimensions of pond: width ~~500' AV.~~ length 2000' ± area 25 ± Acres

Depth of water below spillway level: ~~Varies -- 10' Max.~~

Total length of dam: ~~110'~~

Length of spillway: ~~80'~~

Height of abutments above spillway: ~~5.8'~~

Type of spillway construction: ~~Masonry with flash boards~~

Type of dyke construction: ~~Masonry and earth~~

Character of soil in river bed at spillway location: ~~Ledge~~

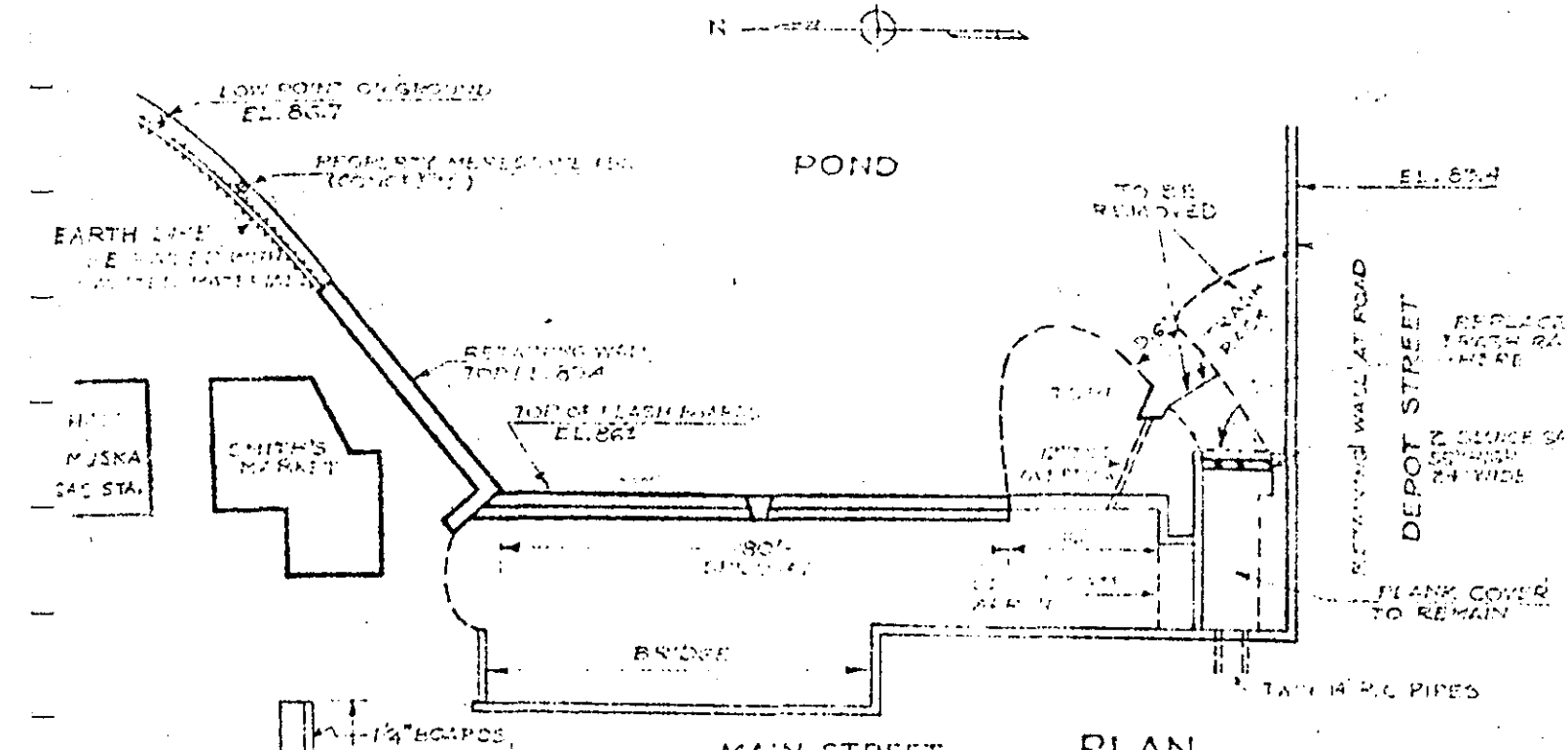
Remarks: ~~Proposed work involves rebuilding flashboards and other repairs.~~

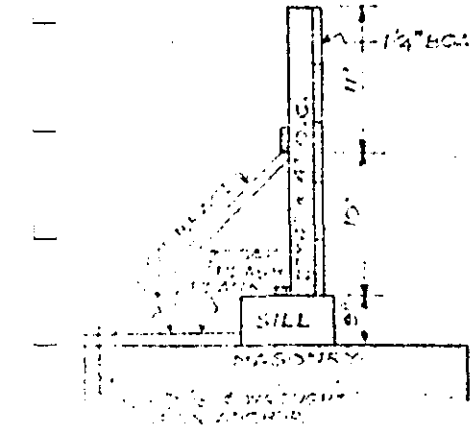
~~See attached Plans.~~

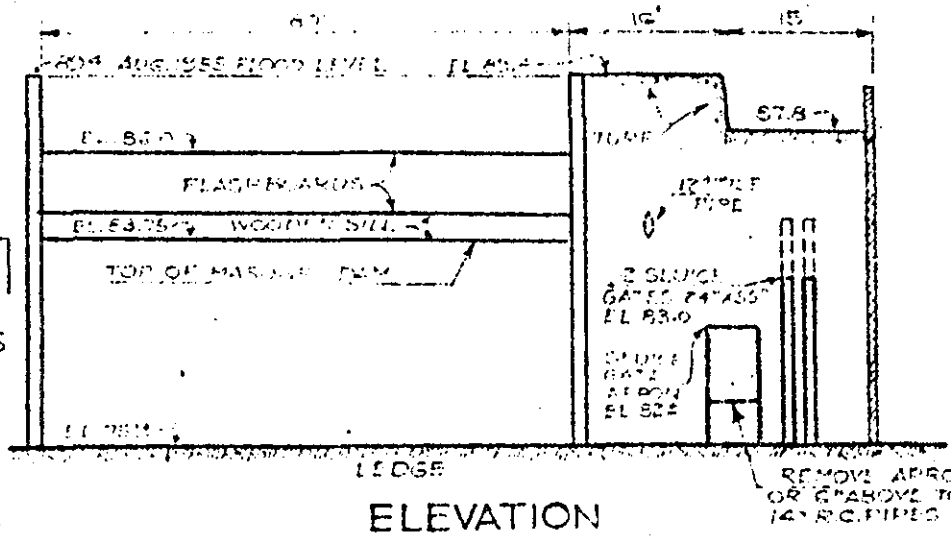
Note: Show details of construction on reverse side.

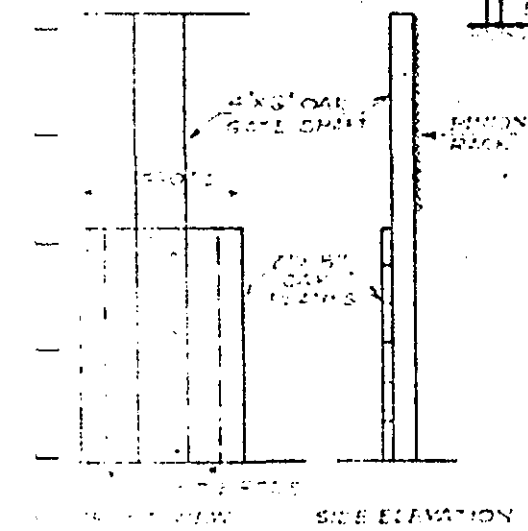
Signed John J. Mozzochi

FOR: HAMILTON STANDARD









MILL POND DAM

PROPERTY OF

HAMILTON STANDARD DIVISION

UNITED AIRCRAFT CORPORATION

BROAD BROOK, CONN.

JOHN J. MOZZOCHI, ENGINEER
GLASTONBURY, CONN.

SCALE— NOT TO SCALE DATE - 6-EC -195

ELEV. DATUM: U.S.C.&G.S. APPROX.

5-56-63

SUBJECT: MILL POND DAM, BROAD BROOK CONN.

DISCHARGE $Q = C_B H S$
$= (0.85)(13.60)(30)$
$Q_{NORMAL} = 348$ CFS
$Q_{100} = 3.7 \times 348 = 1286$ CFS

CAPACITY CALCULATIONS (WITH FLOW 1'-0" ABOVE FLASHBOARD: OR ELEV 87

(1) 2 SLUICE GATES - EACH 24"x90" - BOTH OPEN
$Q = 2 \times C A \sqrt{2gH}$
$= 2 \times 0.70 \times 9.4 \times \sqrt{2(32.2)(5.2)} = 240$ CFS.

SPILLWAY - WITH BOARDS IN PLACE
$Q = C L H^{3/2}$
$= 3.33 \times 80 \times 1^{3/2} = 267$ CFS

TOTAL 507 CFS

$\frac{507}{348} = 1.46$ - EQUAL TO 8 YEAR RECURRENCE

WITH FLOW AT 2' ABOVE FLASHBOARDS OR ELEV. 88

(2) 2 SLUICE GATES
$Q = 2 \times 0.70 \times 9.4 \sqrt{2(32.2)(6.2)} = 263$

SPILLWAY - WITH BOARDS IN PLACE
$Q = 3.33 \times 80.0 \times (2)^{3/2} = 755$

1018 CFS

$\frac{1018}{348} = 2.93$ EQUAL TO 50 YEAR RECURRENCE

WITH FLOW AT 3' ABOVE FLASHBOARDS OR ELEV 89

(3) 2 SLUICE GATES
$Q = 2 \times 0.70 \times 9.4 \sqrt{2(32.2)(7.2)}$ 284 284

SPILLWAY WITH BOARDS IN PLACE
$Q = 3.33 \times 80.0 \times (3)^{3/2} = 1385$

1669 CFS

(4) SPILLWAY WITHOUT FLASHBOARDS
$Q = 3.33 \times 80.0 \times (4.75)^{3/2}$ 2780
3064 CI

RECURRENCE INTERVAL FOR (3) - $\frac{1669}{348} = 4.9 = 275$ YEARS

" " " (4) - $\frac{3064}{348} = 8.8 = 800$ YEARS (ESTIMATED)

JOHN J. MOZZOCHI
CONSULTING ENGINEER
GLASTONBURY • CONNECTICUT

SPECIFICATIONS

FOR

REPAIRS TO

MILL POND DAM

BROAD BROOK, CONNECTICUT

SCOPE

The work involved consists of:

(1) Replacing the existing flashboards with new boards constructed as shown in detail on Sheet No. 1. Re-use existing 1-1/4" Phillipine Mahogany planks as may be salvaged. Replace balance as needed with same material. Reset the existing sill on the northerly half of the Dam. Provide wrought iron anchors for the braces and new 2" oak splash boards.

(2) Removing entirely the masonry retaining wall and embankment between the sluice gate channel and the retaining wall at Depot Street.

(3) Material available from operation (2) is to be used to raise the earth dike East of Hall & Moser Gas Station.

(4) Remove the existing trash rack and install new entirely of wrought iron frame and slats in a new location, just ahead of the sluice gates. Overall size of new rack to be same as existing.

JOHN J. MOZZOCHI
CONSULTING ENGINEER
GLASTONBURY • CONNECTICUT

MILL POND DAM

( ) Repair the sluice gates as needed with about 20 S.F. each of new 2" Oak planks dressed four (4) sides, and a new 4" x [illegible]" x 1'-0" Oak gate shaft. Planks and pintles are bolted to gate shaft. Each gate has 2 - 1/2" ⌀ tie rods.

( ) Remove the masonry portion of the sluice gate apron to a level 6" above top of the 14" R.C. pipes.

( ) Repoint all masonry joints as needed.

NOTE

All repair operations are to be scheduled at times consistent with the need of supplying the [illegible] water requirements of the Plant.

All work shall be of the best workmanship and all material of the best commercial quality. All debris shall be removed from the site. New embankment at rear of Gas Station shall be graded in a neat manner.

June 29, 1956

Mr. John J. Mozzochi
265 Hebron Avenue
Glastonbury, Connecticut

Dear John:-

I enclose preliminary permit for repairs to the flashboards at the dam at Broad Brook, Connecticut. The capacity of this dam is adequate provided the flashboards go under high floods and I should think that they would under the type of construction which you have indicated. The final permit will be issued after the work has been completed.

Very truly yours,

/s/ B. A. Palmer

Member, State Board of Supervision of Dams

BHP/ew
c.c.: Chairman Wm. S. Wise

STATE OF CONNECTICUT

BOARD OF SUPERVISION OF DAMS 3- 31

PRELIMINARY PERMIT

Norwich, Conn.
June 29, 1956

To Owner United Aircraft Corp

P. O. Address Hartford Conn

I have inspected the site and have examined the plans marked Mill Pond Dam

and the specifications therefore, submitted by you to the Board of Supervision of dams for Repairs to Flash Boards

on Broad Brook in the Town of East Windsor

The same are approved, and such proposed construction work is hereby authorized.

Benjamin A Palmer.

Member, Board of Supervision of Dams

B-12

STATE OF CONNECTICUT

STATE BOARD FOR THE SUPERVISION OF DAMS

STATE OFFICE BUILDING · HARTFORD 15, CONNECTICUT

December 3, 1956

Mr. William S. Wise
Chairman, State Board for Supervision of Dams
Hartford (15) Connecticut

Dear Mr. Wise:-

I enclose copy of Preliminary and Final certificates granted to United Aircraft Corporation for work on the dam at East Windsor.

Very truly yours,

B. H. Palmer

Member, State Board for Supervision of Dams

BHP/ew
Enc.

STATE OF CONNECTICUT

BOARD OF SUPERVISION OF DAMS

3- 31

CERTIFICATE OF APPROVAL

Norwich, Conn.
Oct. 1, 1956

To Owner United Aircraft Corp
P. O. Address Hartford Conn
Name of Structure .....

This is to certify that the following construction work: Repairs to flash boards, performed on property owned by you on Broad Brook, in the Town of East Windsor for which preliminary permit was issued June 29 1956 has been completed to the satisfaction of this Board and that such structure is approved and has been found to be safe as of date of this certificate.

BOARD OF SUPERVISION OF DAMS
BY Benjamin H. Palmer, Member

Note: The owner is required by law to record this certificate in the Land Records of the town or towns in which the dam

March 20, 1963

Mr. A. J. Macchi
44 Gillett Street
Hartford, Connecticut

Dear Mr. Macchi:

Under your terms as a consultant to this office would you kindly inspect the following dams: Broad Brook, Mill Pond, dam on Chestnut Brook and Windsorville Pond in the Town of East Windsor and submit a report to this office as to present condition of the above named structures. Also include in your report the action this Commission is to take in each of the above mentioned dams.

Very truly yours,

Emitt A. Dell
Field Inspector

EAD:js

DAM AT BROAD BROOK MILL POND
TOWN OF EAST WINDSOR
REPORT OF INSPECTION BY A. J. MACCHI, ENGINEERS
ON MARCH 22, 1963

This dam is located on Broad Brook west of the Main Street in Broad Brook Center. The dam consists of a vertical stone wall with earth fill backup. The watershed area is approximately 9,000 acres and extends east to an area above the town of Rockville. There are numerous residences and manufacturing plants below the dam site. The dam is owned by Hamilton Standard, Division of United Aricraft.

Water elevation is controlled by wooden flashboards which have been designed to fail before the water elevation becomes critical and tops the embankment adjacent to the dam. Our review of this design indicates that in this type of flashboard, which is intended to fail by rotation of the unit about a horizontal axis when the design head has been reached, the location of the axis of rotation and the detail at this hinge is very critical. Inasmuch as it is the design objective that these flashboards fail before the critical elevation is reached, which would flood adjacent buildings, it is recommended that the design of these units be reviewed and modified if necessary in order to be positive about their function.

Buck ? is investigating
5-17-63

A. J. MACCHI • ENGINEERS
DR. GIULIO PIZZETTI — ASSOCIATE CONSULTANT

44 GILLETT STREET — HARTFORD, CONN. — PHONE 525-6631
17 CORSO DUCA ABRUZZI — TORINO, ITALY — PHONE 519-473

N.S.P.E. — A.S.C.E. — A.C.I.

April 18, 1963

Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Connecticut

Re: Dam at Broad Brook Mill Pond

Gentlemen:

Reference is made to our report of inspection at the above dam on March 22, 1963, wherein we recommended that the design of the flash boards be reviewed.

Please be advised that this office has corresponded with John J. Mozzochi, Engineers for Hamilton Standard, owners of this dam, and they intend to revise the flash-boards in a manner acceptable to this office.

Very truly yours,

A. J. MACCHI, ENGINEERS

H. R. HOFFMAN, P. E.

cc. John J. Mozzochi & Associates

TOWN OF EAST WINDSOR

CONNECTICUT

INCORPORATED MAY, 1768

BOARD OF SELECTMEN
P. O. Box 366
BROAD BROOK, CONNECTICUT

June 1, 1966

State of Connecticut
Water Resources Commission
State Office Building
Hartford 15, Connecticut

Dear Sir:

Hamilton Standard, Division of United Aircraft Corporation has offered the Town of East Windsor a gift of the Broad Brook Pond and some land surrounding it.

This offer was presented before a Special Town Meeting on May 26, 1966 and the vote was to accept the offer with two provisions:

1. That the towns insurance carrier would insure the area against any and all liability.
2. That the Board of Selectmen obtain a favorable written report from the State Water Resources on the condition of the dam.

I am therefore asking the Commission for a report on the dam's condition.

Very truly yours,

John L. Daly Jr.
First Selectman

A. J. MACCHI • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE 525-6631

A. J. MACCHI
H. R. HOFFMAN
K. E. GRIFFES
J. J. SCHMID

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

June 22, 1966

State of Connecticut
Water Resources Commission
165 Capitol Avenue
Hartford, Connecticut

Attention Mr. William Sander

Re: Your Letter 6/17/66
Broad Brook Dam
Broad Brook, Connecticut

Gentlemen:

Inspected the above-referenced dam on Tuesday, June 21, 1966. This dam was previously reviewed on March 22, 1963.

In our previous report we asked for a modification of the flashboard detail which is designed to fail safe. The requested changes have been made.

The flashboards need clearing of debris at the present time and periodically this should be done to allow free movement of the flashboards. The growth of small saplings at the south abutment should be removed.

The dam is in safe condition.

Very truly yours,

A. J. MACCHI, ENGINEERS

A. J. MACCHI

Copy given at [illegible]

[illegible]

Windsor Locks, Connecticut 06096

Please address answer to
Mail Stop No. 2-M-1

March 29, 1976

Mr. Edward Hastillo
First Selectman
Town of East Windsor
Town Hall
Broad Brook, Connecticut 06016

Dear Mr. Hastillo:

We have had two occasions of significant property damage at our Broad Brook facility caused by a failure to relieve the water pressure at the dam during heavy flooding conditions, and the resultant failure of the top rails. In each case, the damage has exceeded $2,500. The situation is further aggravated since it takes a long time to have the town replace those top rails. As a result, we operate with limited water flow. I hope you can expedite the repair of the dam.

We also expect that in future flooding conditions the town will take whatever action is necessary to relieve the pressure on the top rails to prevent resulting downstream damage to private property. This letter constitutes notice that should the Town of East Windsor not take necessary corrective action to ensure that no further damage is caused to the property of Hamilton Standard, we will expect the Town to be liable for and pay the cost of any further damage.

We request that you advise us as soon as possible of the corrective action you propose to take to alleviate the problem.

Very truly yours,

HAMILTON STANDARD
Division of UTC

Richard Ryan
Plant Engineer

RR:ekb

Division of [illegible]

Telephone (203) 623-1621 — Telex 9 9288 — TWX 710-420-0584

COPY

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115

COPY

12 April 1976

Mr. John Macchi
Macchi Engineers
44 Gillett Street
Hartford, CT

Re: Broad Brook Millpond
East Windsor

Dear John:

Under the terms of your contract to act as a consultant to this department, would you please inspect the subject dam and submit a report on the safety of the dam.

The dam is located in Broad Brook in the northeast section of East Windsor east of Route 191.

Very truly yours,

Victor F. Galgowski
Supt. of Dam Maintenance
Water Resources Unit
Telephone no. 566-7245

VFG:ljk

BROAD BROOK MILL POND

EAST WINDSOR, CONNECTICUT

REPORT ON CONDITION OF DAM AND
FACTORS RELATIVE TO ITS USE

BY MACCHI ENGINEERS, HARTFORD, CONN.

MAY 4, 1976

LOCATION - Dam is located on Broad Brook just east of Main Street bridge in East Windsor, Connecticut.

DESCRIPTION - This dam is a stone masonry wall approximately 8'-3" high, setting on bedrock. It is topped with a heavy wood sill and flashboards about 1'-10" high having an overall length of about 96' which form the spillway. See attached sketch, revised to date.

OWNER - Town of East Windsor.

CONDITION - The dam is a safe structure in good condition and in no danger of failure. The critical factor is how best to allow passage of flood flows with a minimum of exposure by erosion of the downstream banks, a distance of about a mile to the confluence with the Scantic River. The hinged flashboards which are used to raise the pond level overturn on flood flows and contribute to the erosion.

HYDRAULICS - The drainage area above this dam is about 9,062 acres and the flood flows using Connecticut Flood flow formula are calculated to be:

Annual Flood	1,000 c.f.s.
5 Yr. Flood	1,300 c.f.s.
10 Yr. Flood	1,600 c.f.s.
100 Yr. Flood	3,700 c.f.s.
200 Yr. Flood	5,000 c.f.s.

Mozzochi Engineer's sketch dated 6/22/56 indicates a pond elevation of 89.4 for the 1955 flood. Assuming flashboards were washed out, the flow estimates to be approximately 4,300 c.f.s., a 200 year flood.

Since 1961, a U.S.G.S. gaging station has been located approximately 2000 ft. downstream at the Mill Street crossing.

The following peak flow data was made available by Mendal Thomas of the U.S.G.S. office in Hartford:

2/3/70	800 c.f.s.
3/3/72	800 c.f.s.
6/30/73	708 c.f.s.
9/27/75	1140 c.f.s.

The September 27, 1975 peak flow of 1140 c.f.s. coincided with a 24 hr. precipitation of 3.07" at nearby Bradley Airport during the previous day.

The October 19, 1975 washout of flashboards occurred during a 3 day rainstorm with precipitation of less than 1.5"/24 hrs.

The February 1976 rainfall conditions were less severe.

HISTORY - Hamilton Standard is the previous owner of the dam and within the last few years turned over ownership of the dam to the Town of East Windsor. Hamilton Standard still uses the water from the mill pond for processing in the nearby plant and maintains a weir downstream to take water for fire protection.

We were informed by local residents and Mr. Ray Morris, Assistant Plant Manager and Harry Ishler, local plant maintenance, both of Hamilton Standard, that flashboards have washed out twice within the last year; once in October, 1975 and in February, 1976. On both occasions we were told the water level in the pond was only slightly above the top of the flashboards. Checking precipitation records for both these times, we find there was insufficient rain to cause flashboards to fail by overturning as per design. Most likely, the flashboards failed because the struts were inadequate.

On these occasions when the flashboards failed, Mr. Morris claims scour damage occurred to an area downstream adjacent to the brook where large tanks are located. He stated that when Hamilton Standard maintained the dam they relieved the pond build up by opening the two sluice gates at the start of a storm and this practice prevented flashboards from washing out. This practice has not been continued since the Town has taken over the dam. About one-half of the flashboards washed out. We estimate this discharge to be comparable to annual flood of about 1000 c.f.s.

FINDINGS & RECOMMENDATIONS - The location of the flashboard hinge is a sensitive and critical factor in establishing the height of water above the weir required to cause overturning. We learned that this hinge point as related to total height of the flashboards was changed from dimensions obtained from 1963 records. We waited for a low flow day to verify actual measurements. From this information it was determined that the height required to overturn the flashboards is approximately 2 ft. During the recent failure of the flashboards the water did not reach this 2' height and therefore, the bracing system must have given way.

In checking the channel of this brook from the dam to where it flows into the Scantic River, a distance of about a mile, we find that this water course is very meandering and restrictive, and that some erosion of banks by a large flood flow is unavoidable, especially where the channel changes direction. It is recommended that property adjacent to the edge of the brook not be used for permanent installations unless banks are protected. A sudden release of a wave of water when flashboards let go can be very destructive to the banks. Whereas, if the flashboards remain in place, the flood flow will be more gradual and over a longer period of time.

All flood flows are normal (natural) exposures to adjacent property. However, sudden discharges which exceed unrestricted conditions are open to questionable liability.

It is recommended that flashboards be fixed in place (cut down 6" from present height to elevation 85.5) and that sluice gates be opened at the beginning of anticipated heavy storms. The fire company across the street could assume this responsibility for the Town. These sluice gates can be made automatic by use of float switches and electric motor, if so desired.

This operation will allow passage of 100 year storm without overflowing banks. Storms greater than this will wash over adjacent parking area and possibly across the road.

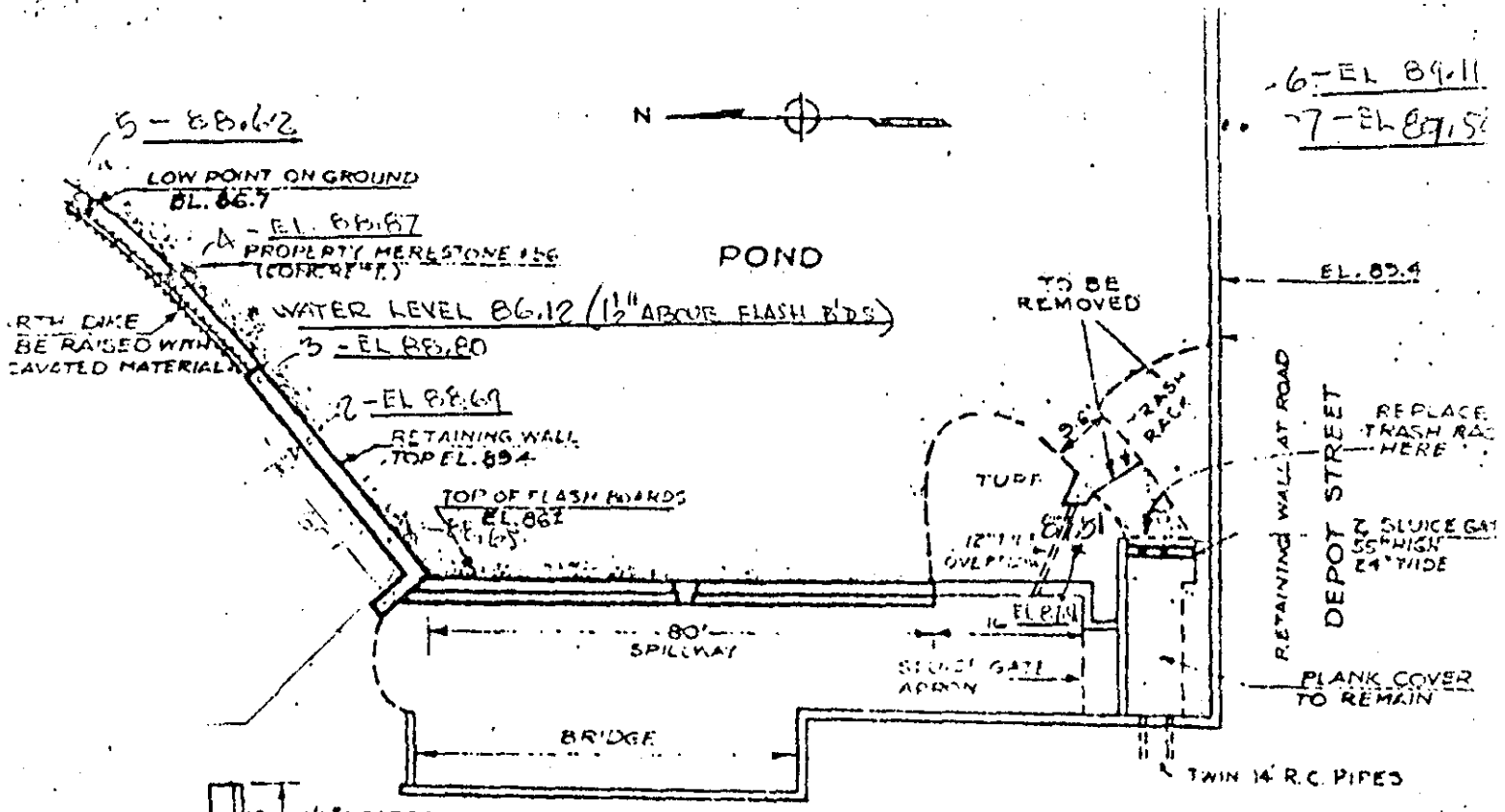
If the elevation of 86.0 (the present top of the flashboards) must be maintained, then it will be necessary to increase the banks to maintain a 6" freeboard along the shores of the pond.

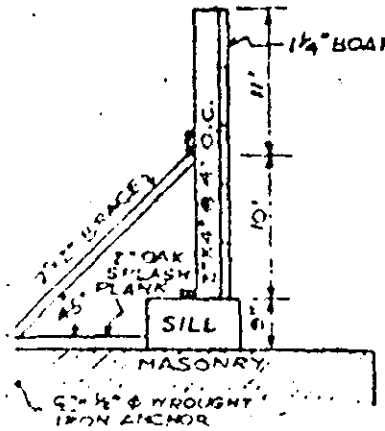
To make flashboards permanent, the braces (struts) for the flashboards should be made stronger using a second 2 x 4 brace near the top of the vertical member. The flashboards should then be inspected annually and after every heavy flood flow.

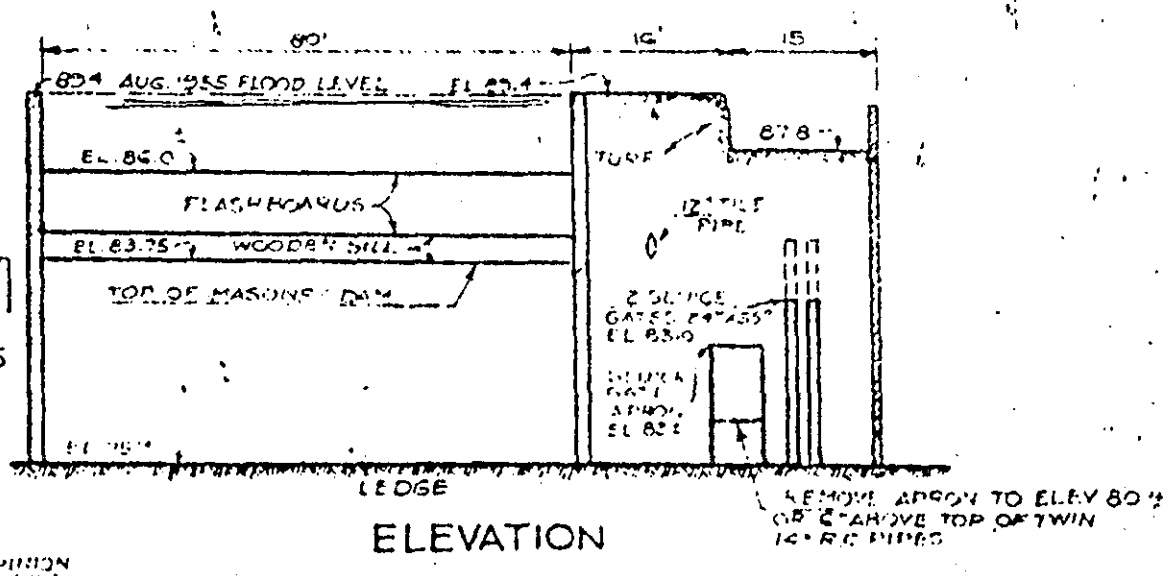
MACCHI ENGINEERS

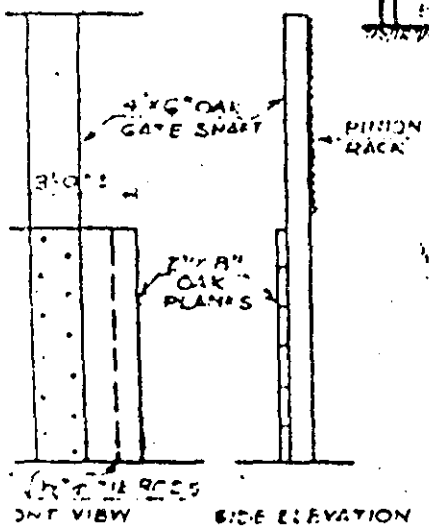
A. J. MACCHI, P.E.

STATE OF CONNECTICUT
ANSELMO JOHN MACCHI
REG. 2983
REGISTERED PROFESSIONAL ENGINEER









MILL POND DAM

PROPERTY OF

HAMILTON STANDARD DIVISION

UNITED AIRCRAFT CORPORATION

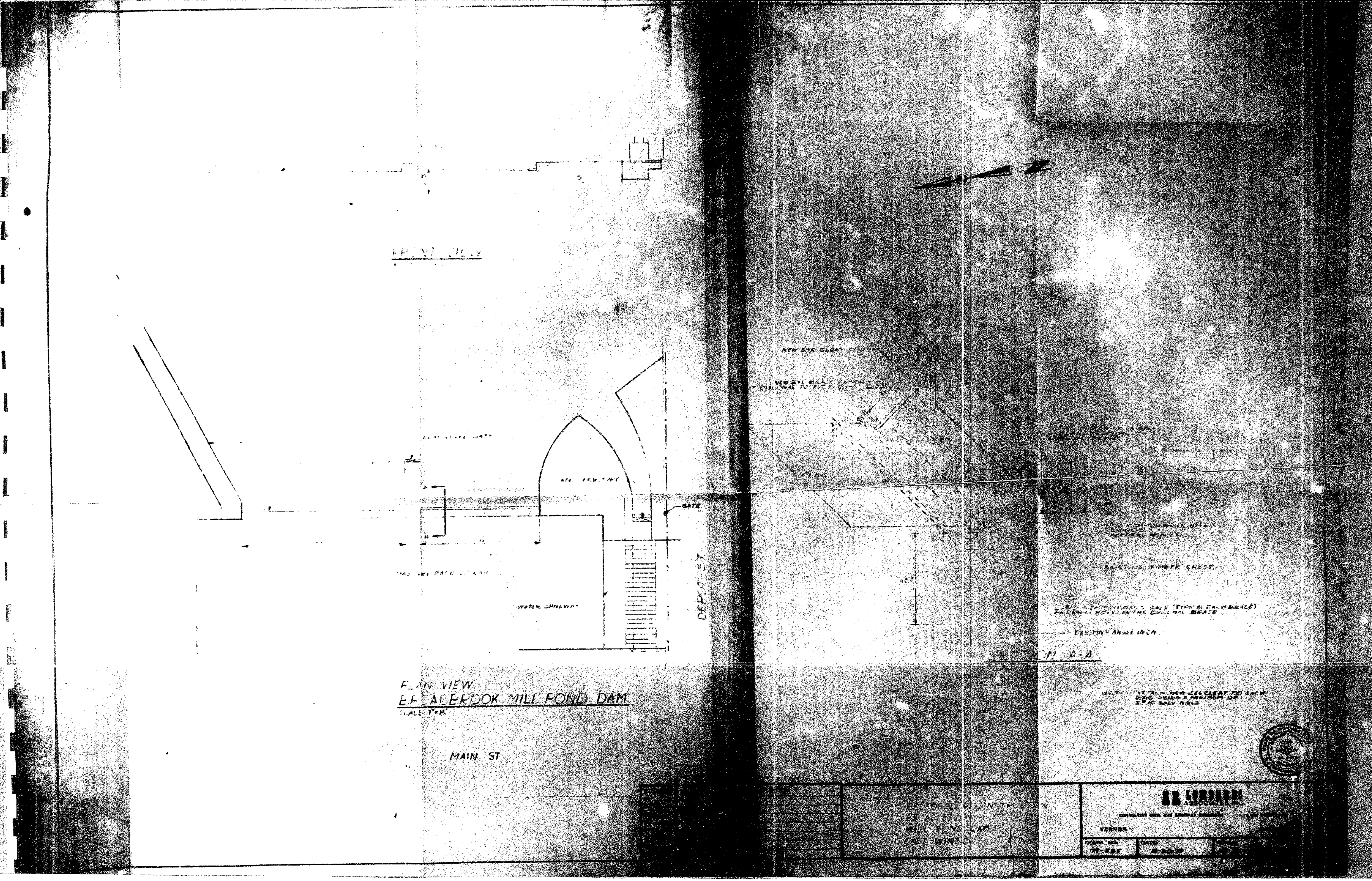
BROAD BROOK, CONN.

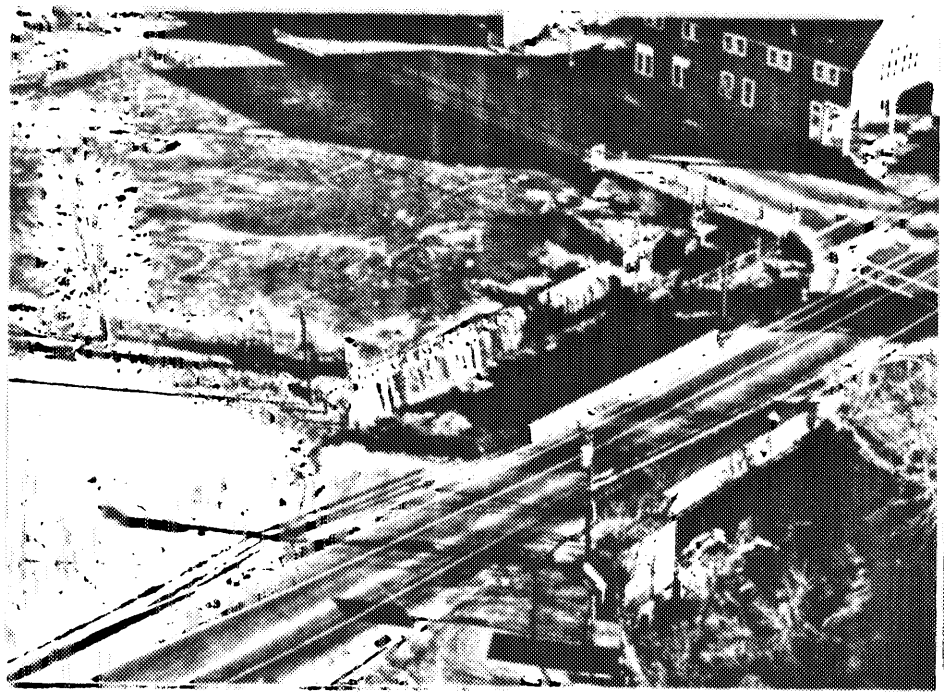
JOHN J. MOZZOCHI, ENGINEER
GLASTONBURY, CONN.

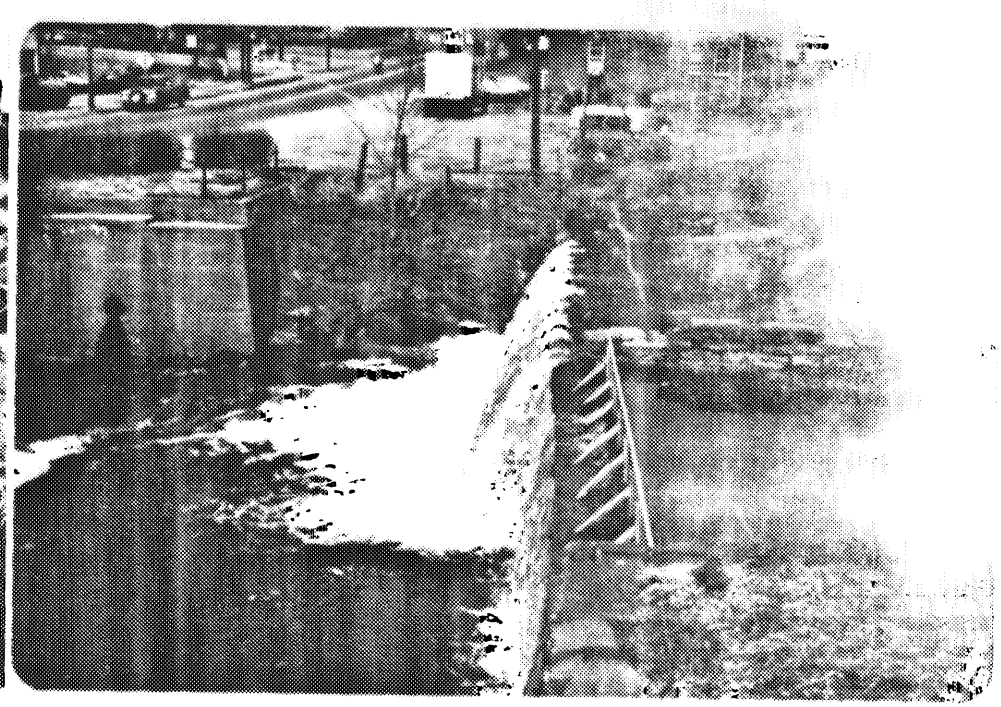
SCALE— 1/8" TO SCALE DATE 6-22-1956

ELEV. DATUM: U.S.C. & G.S. APPROX.

INFORMATION AS OF APR. 15, 1976


PLAN VIEW
MILL POND DAM
MAIN ST
GATE
VERNON





CT-00271 Broad Brook Mill Pond Dam